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## SCIENTIFIC MANAGEMENT IN GOVERNMENT ESTABLISHMENTS[1]

BY GEN. WILLIAM CROZIER.[2]

The title of my address might be understood to indicate that there is some difference in the practice of scientific management in the government service and in private industry. In practice I think that there is not much difference, if there is any; but that there is some difference in the character of the troubles which are encountered through such opposition as there may be to the system, some of which I will bring to your attention later on. I do not have to tell the members of this assemblage what is meant by the term "Scientific Management," nor to describe what the practice of scientific management consists of; but just to be sure that we are thinking about the same things, I will indicate the divisions of the subject under which I will speak of the experience of the Ordnance Department of the Army with it.

*Taylor System.*

The Taylor System of Scientific Management, which is the one we have partially installed in the Ordnance Department, and in pretty full practice at one of the arsenals, can be divided into two general parts. The first part relates to the systemization of the processes of manufacture so that these processes shall be carried on in a perfectly orderly manner, with better forethought than has ever before been given them, and with more detailed arrangement concerning the relations of the processes to each other and the manner in which the work shall proceed through the establishment, without loss of time through collisions or sidetrackings of any of the component parts of it. Of course there is nothing new in systemization, since all persons connected with the management of industrial establishments have, from the beginning of industry, been giving attention to the system and order with which the work of their establishments should be conducted. The new thing for which we are indebted to Mr. Taylor is the realization of the degree of attention which it is worth while to devote to this subject, and of the amount of time, energy, and money which can profitably be expended in connection with it.

It is said on behalf of the opponents of the introduction of scientific management that they have no objection to the systemization features. While the experience of the Ordnance Department accords generally with this claim, it does not absolutely confirm it.

It was in the year 1909 that the inauguration of the Taylor System of Scientific Management was commenced at the Watertown Arsenal, in Massachusetts, of which arsenal the principal output is seacoast gun carriages. The manufacture of seacoast gun carriages resembles that of large machine tools very closely, so that the general character of the shops at the arsenal can, by means of this comparison, be very well understood. The arsenal has a foundry, a forge shop, a machine shop, a pattern shop, and a laboratory. After the introduction of the systemization features had proceeded to a fairly complete stage, I assembled at the Watertown Arsenal the commanding officers of the other large manufacturing arsenals of the Ordnance Department, of which there are five. I subsequently sent to the Watertown Arsenal assistant officers from each of the other four arsenals and kept them there for periods of from a month to six weeks, with the object of having them absorb as much as they could in this time of the special features of systemization which had been put in practice at the Watertown Arsenal, and with such assistance as could be had by correspondence, and with the aid of the central control which I could exercise, to put in practice at their own stations the beginnings of the method of systemization.

At the Rock Island Arsenal, in Illinois, one of the first new features to be introduced was the job card. You know what a job card is. It carries the name of the workman to whom it is given, a statement of his particular job, the time of its commencement and completion, the rate of pay of the workman, and a few items of information with reference to inspection, etc. The principal object of the card is to enable the cost division to charge the cost of the job to the proper order; and incidentally it serves as an assistance in making estimates for new work, and for various other purposes. There was very strenuous opposition to the introduction of this card at the Rock Island Arsenal upon the part of Organized Labor, some of the labor officials going to the vicinity of the arsenal to assist in the manifestations of opposition. The opposition did not abate when it was explained that the object of the card had nothing to do with any efforts which the workmen were expected to make, nor with the compensation for them, but was only intended for the purposes which I have described. Representatives of the opposition demanded as a condition of its introduction that there should be a promise that the features of the Taylor System which do directly affect the workman should not in the future be adopted at that arsenal. The opposition was not yielded to, but after full explanation the use of the

(1) An address delivered before the Philadelphia School of Commerce and Accounts, October 12, 1915, in the hall of the Y. M. C. A. The views expressed are not intended in any way to commit the War Department, which is aware of what has been done in the arsenals of the Ordnance Department but has not taken any final position in regard thereto.

(2) Chief of Ordnance, United Stated Army, Washington, D. C.

card was insisted upon, and it was duly introduced and has been in operation ever since, the threats of the opponents to it never having been carried out. Perhaps it would not be fair to infer from this incident that opposition to the job card was because it was a feature of systemization; but it is apparent that this essential feature of good management would, if it had been possible, have been excluded from this establishment, unless the price of its admission had been conceded. However, the cessation of the opposition may be taken as a tacit admission of a mistake upon the part of the opponents, and therefore to their credit.

*Stimulating Features.*

The second part of the system relates to the quantity of output which may be expected from the workman, and to the stimulus offered him for coming up to the expectation, or for measurably approaching it. As practiced by the Ordnance Department it is represented by the features of time-study and premium-payment. Time-study, as you know, is made for the purpose of ascertaining the best order and sequence in which a given job of work can be done, and the time which it should reasonably be expected to occupy; and premium is a percentage of the day's wages of the workman which is given to him, in addition to his day's wages, for attaining this reasonable time, or for approaching, or exceeding it.

The theory of time-study and premium-payment, concisely stated, is that the ascertainment of the best and most expeditious way of doing a piece of work is too difficult and complicated a process for the workman to have any chance of arriving at it unaided, and that it must be determined by careful and painstaking study upon the part of a sometimes highly paid specialist; and that the current rate of wages does not correspond to the best directed and reasonably industrious effort of the workman, but corresponds to the degree of effort under which the current rate has grown up, which is far from the best. The Watertown Arsenal is the only establishment in the government service at which the combined features of time-study and premium-payment have been installed and practiced, and the title of this address calls for some statement of the experience had with them, since these features are the ones upon which interest is concentrated by reason of the strenuous opposition of Organized Labor.

After about two years of systemization the time-study and premium-payment features were introduced at the arsenal, commencing with the machine shop, in 1911. There was no opposition or objection. The workmen to whom these features were applied appeared to be interested in them, to be content to work under them, and to enjoy the premiums earned. There was the usual experience of great reduction in the cost of work and in the time required for its completion, and a substantial increase in the earnings of the men, accompanied by no complaint of overwork. Later experience has borne out early indications; great economy and substantial benefits to the workmen have continued. In a government establishment there is lacking the satisfactory demonstration of improvement made in manufacturing methods which comes from increased profits, since there are no profits to be considered, and therefore improved economy can only be demonstrated by comparison of the cost of items of work with that of similar items in preceding years, when such comparison is possible. There have been few cases at the Watertown Arsenal where identical articles have been made under identical circumstances in different years. Perhaps the best indication of the economy due to the features under discussion is had from an analysis which has been made of some 39 typical jobs of which the records were on hand, including the time required to do them, both on the day-rate and premium-payment systems. In four cases jobs under the two systems had been done by the same men. The increase of output in a given time under the premium system of payment was shown by the analysis to be about two hundred per cent; and in the four cases in which the jobs had been done by the same men it was shown that these men did 2.72 times as much when working under the premium system as when working under the day-wage system. As regards the workmen, the four years' experience with these features shows that the average increase of pay earned by men while on premium jobs is something over twenty-five per cent of their regular day wages, which are prescribed in accordance with those of the vicinity for work of like character.

*Opposition.*

After two or three months of successful use of the time-study and premium-payment system in the machine shop, it was decided to extend it to the foundry, and upon an attempt to introduce it there the moulders went out in a body. They, however, returned to work almost immediately upon an investigation being ordered by me, without condition, and pending the investigation the inauguration of the new features was proceeded with, again with the usual results of advantage both to the Government and the employees. In the meantime Organized Labor had taken alarm, and had issued a strong circular in opposition to the introduction of the system in government establishments, and otherwise commenced active opposition, which still continues.

The agitation resulted in the appointment of a special committee of the House of Representatives to examine into the subject; and here is exhibited the peculiar kind of difficulty which is encountered in the government service. In civil establishments the principal weapon of Organized Labor is the strike, and upon the successful use of it depends the power of labor organizations to carry their points, after failure of attempt at agreement with employers. I do not fear the strike in government establishments. The strike in the foundry at the Watertown Arsenal proved a trifling affair. I doubt the power of labor organizations to hold their members out of the government employ, against the advantages which that employment offers; and even if I am mistaken in this, and the government workmen who are members of labor unions should obey the union's orders and remain away from their employment upon strike, I am sure that there would not be the slightest difficulty in filling their places with other men who would not resist the many attractions which the government service offers, including eminently fair treatment by officers who have no motive for any other kind of treatment, and including, in the particular point under discussion, the substantial advantages of premium payment, which I believe the workmen enjoy and do not want to give up, although union discipline is oftentimes so strong that they will not say so.

In the government service Organized Labor has another weapon, which is its political power. As a rule those holding elective office in keen competition with rivals have a wholesome fear of organizatons among their constituencies. The fear of the Women's Christian Temperance Union, and of the sometimes mythical individual who holds, say, the Methodist vote in the hollow of his hand, has been more than once apparent; and the political power of Organized Labor, or the apprehension of such power, does not need any demonstration.

The special committee of the House of Representatives spent a portion of the winter of 1911-12 investigating the

practice of the Taylor System at the Watertown Arsenal; but otherwise than as may be gathered from the three volumes of testimony which are printed, the committee did not include in its report any statement of the conditions as it found them at the Watertown Arsenal and of the conclusions which should be drawn from them. It took occasion to mention a number of reprehensible practices, oppressive in their nature, for strong condemnation; but it did not find, and did not say that it had found, any of these practices at the Watertown Arsenal. It is difficult to understand why they were mentioned, as they are condemned by all right thinking people, and would be summarily denied entrance into any establishment of the Ordnance Department. The Committee, however, recommended that there should be no legislation upon the subject of scientific management in government establishments at that time. The arsenals, navy-yards, and other government establishments are conducted by officers, usually under the direction of a cabinet officer who is, of course, responsible to the President, elected by the people. The proper consideration of the ultimate interests of all members of the electorate who are also employees of the Government may therefore be assumed. The establishments are carried on under laws and regulations made in pursuance of laws, which are enacted by the Congress. The control of the Congress over such methods of management as can be made the subject of legislation is therefore complete. If not prevented by prohibitive legislation, I am confident that the system of scientific management, as it is now practiced at the Watertown Arsenal, can be carried on successfully, to the mutual advantage of the Government and the employees, and with the cheerful compliance of the employees, although probably not of the labor organizations of which some of them are members.

Since the investigation by the special committee of the House of Representatives, the practice of scientific management has gone on at the arsenals about as it had before, except that the systemization has progressed and become more extensive, and the accumulation of data as the result of time-study has permitted an increasing amount of work to be assigned and performed under the premium system. The time-study and premium features, in combination, have been introduced at no other arsenal than Watertown, but they have continued in practice at that place. Owing to the agitation of the subject these features have been considered as still on trial, and I may add that their ultimate fate is very much on trial. The course of events has been marked by the introduction of bills in Congress prohibiting the contested features of the system. Hearings by the Committee on Labor of the House of Representatives, have been held upon the subject of the bills, and reports favorable to the passage of the bills have been submitted to the House by this Committee, and to the Senate by the Committee on Education and Labor, while petitions for the abolition of these features have been forwarded to the War Department by committees of the employees at the Watertown Arsenal, in some cases signed by many of the employees themselves. The evidence offered external to the arsenal by these bills, reports and petitions would indicate a state of extreme discontent existing at that place, produced by an oppressive system against which the employees might be expected to revolt violently at any minute; while the internal evidence at the arsenal itself has been of a state of the utmost harmony and good feeling, with cordial cooperation, industry, and suggestiveness, accompanying good working conditions; which has produced economical manufacture and increased earnings. The hearings which have been held by the Committee on Labor of the House of Representatives have not been nearly as complete as those which had been held by the special investigating committee of the House, early in the practice of scientific management at the arsenal. This may be partly accounted for by the fact that the earlier hearings were available for the Committee on Labor, which quoted freely from them; but in this connection it ought to be stated that much of the testimony given at these earlier hearings was colored by apprehension as to what the system would bring forth, and not based upon experience of its actual operation. The reports of the Committee on Labor of the House and of the Committee on Education and Labor of the Senate are directly in favor of the abolition of the efficiency features, but none of these bills have arrived at a stage of consideration upon the floor of either House. Some of the conclusions of the reports are very curious; one of them, for instance, says that the claim of increased earnings for the workmen was shown to be unfounded, and that as a matter of fact wages were reduced. This conclusion was worked out by showing that if a man did 2½ times as much work under the premium system and received only 33 1-3 per cent more pay, his pay per unit of work must have been less, which the Committee called a decrease of wages, notwithstanding the fact that under this kind of operation a $3.00-a-day man would earn $4.00 in the same length of time.

*Petitions.*

The petitions coming from the employees of the arsenal constitute the hardest evidence against the system to satisfactorily meet. The signatures may be held as good for their face, and rightfully to be counted as representing the free opinions of the signers. Two petitions, which can be taken as typical, were submitted in the summer of 1913. They recite a number of complaints which may be listed as follows:

1. Opportunity for earning premiums is afforded low-class workmen at the expense of high-class workmen.
2. One high-class workman is afforded opportunity of earning premiums while another is not.
3. The time allowed for the performance of work is too small, that is, there is speeding-up.
4. Objection is made to the methods which the time-study man prescribed for doing a piece of work.
5. That there has been cutting of rates in the foundry.
6. Difference of weather conditions is not taken into account in outdoor work.
7. Too large a shovel has been required by the time-study man to be used.
8. That a majority of the men are failing in health.
9. That the number of accidents in the shops has been increased.
10. That the number of rejections for spoiled work has increased.
11. That there has been no increase of wages, except by premiums.
12. That the cost of the work has increased, as evidenced by the necessity for giving out at contract pattern work which could have been done at the arsenal.
13. That there is distrust between the employees and the management, and a state of unhappiness has been created.

The first point is the one which is most commonly made against scientific management, which is charged with the special object of substituting low-grade workmen, trained to do some single thing and paid for output at a higher rate than unskilled laborers but at a less rate than the skilled men whom they are designed to replace, for the

skilled craftsmen, to the detriment of the latters' trade. I deny that this substitution is a special process of scientific management. It has been going on in all industries of which the output is a considerable number of identical articles, since a time long antedating the introduction of scientific management. The shoe trade is an example; and in the government service we have also a very prominent example in the manufacture of the service rifle, which in the early days was made in all its parts by an experienced and skillful gunmaker, but is now much more satisfactorily made by the combined efforts of a large number of workmen, each of whom performs a single operation or a limited number of operations; with the result that better rifles, interchangeable in all their components, are produced with incomparable cheapness as compared with the former cost.

As to the desirability of this process of substitution I will speak later on, but at this point I wish to state that at the Watertown Arsenal the charge that low-grade workmen are favored in premium opportunities at the expense of those of higher grade is not sustained by the facts. High-grade machinists receive $3.52 per day, low-grade machinists receive $2.56 per day, while certain machine operators receive $2.40 and $2.24 per day. During a certain period for wihch the records were easily available, there was paid the high-grade machinists increased earnings in premiums of $426.14 each, which was equivalent, for each of them, to 121 days' pay. During the same period there was paid to the low-grade men—the $2.56 per day men—a sum averaging $144.44 each, amounting to 56 days' pay. It is thus seen that the high-grade machinists were very much more fortunate than those of the lowest grade. During the same period there was paid to the $2.40 and $2.24 per day machine operators sums amounting respectively to $49.00 and $14.00 for each; so that it seems that these men, who are of the class whose work is mentioned as being frequently substituted for that of high-grade machinists, not only did not fare as well as did the high-grade machinists, but came out more poorly than even the low-grade machinists. The reason for this is that there is very little repetition work at the Watertown Arsenal, and it is therefore not practicable to substitute machine operators or handy men to any extent for skilled craftsmen; and the truth is thus illustrated that the extent to which this substitution can take place depends, not upon the practice or otherwise of scientific management, but upon the character of the output of the establishment.

The second point; that all machinists do not have equal opportunities for earning premiums, may have some foundation. Some jobs do not lend themselves readily to time-study, either because of their character, or because of the fact that they are not to be repeated. Effort is continually being made to increase the amount of premium work at the Watertown Arsenal, and a fair degree of success has been attained. During the month of May last, 10 molders out of 11 had some premium jobs; in the machine shop, 167 machinists out of 199, and 27 machinist's helpers out of 82 had premium jobs; among the laborers 27 out of 61 had them; and in the carpentershop, 6 carpenters out of 16. The management tries to give all employees some chance at premium jobs, and when a man does not get a chance, his pay suffers no dimunition as compared with what it has been, or with that of similar workmen in the vicinity. There is thus nobody hurt, while some are benefited. In its essence, the complaint amounts to one of too little premium system, instead of too much of it.

As to the complaint that the time allowed is too short for the performance of the jobs which are assigned, it can be met by the statement of the actual result in earnings. The Commanding Officer of the Watertown Arsenal makes a report each month of the premiums earned by the employees of that establishment. In his report for the month of May, 1915, the premiums paid for that month range from practically nothing to $49.08, which was the extra sum made by a man whose day rate was $3.28, whose total day-rate pay for the month was $83.23, and whose premium therefore increased his pay by 59 per cent. The percentage of extra compensation earned by all of the men on premium jobs while so working, on the average, was, in the foundry, 28.13 per cent; in the machine shop, 24.02 per cent; by machinist's helpers, 24.2 per cent; by laborers, 32.53 per cent; by teamsters, 31.33 per cent; by blacksmiths, 17.86 per cent; by blacksmith's helpers, 20.59 per cent; and by carpenters, 32.79 per cent. The average premium in the month of May of all of the men earning premiums was $9.94, which was earned by 327 out of about 650 employees. This average would have been greater if these men had worked on premium jobs all the time, but this, of course, was not possible. The total sum paid in premiums during the fiscal year ended June 30, 1915, was $31,308.96, and in addition, $2,816.43 was earned in premiums during the period between January 25 and March 9, but was not paid because during that period premium payments were suspended on account of special agitation of the subject which was going on in Congress at the time. The total extra sum earned in premiums during the fiscal year 1915 was thus $34,125.39, which was shared by about one-half of the 650 employees.

The fourth objection, as to the method of doing work which was prescribed by the time-study man, has reference to a forging job during the time-study of which the time-study man had told the blacksmith to put a second piece into the fire while he was forging the first, so that is might in the meantime be getting hot. As a matter of fact, upon objection by the smith, the point was not insisted upon; but in making up the time to assign to the job the assumption was made that this simultaneous work should be done, that is, a piece should be heated while another was being forged. In the actual performance of the work the blacksmith did it in the assigned time and thus earned the full premium of 33 1-3 per cent.

I will not take up your time by going over the other complaints in detail; there was no difficulty in answering all of them, and showing them to have as little foundation as the ones which I have specifically described. As to the number of accidents, the records show that there were not as many among the premium workers as among the day workers. There had been no evidence of failure of health upon the part of the men, and no complaint of it. A number of men questioned on the subject denied it, and no man could be found who claimed, or would admit, that his health had been injuriously affected, and no man claimed that he had been overworked. As to the rejections for spoiled work, the records show that these also have been no greater among the premium workers than among the day workers.

### *Reasons for Opposition.*

The question remains to be answered as to why there should have been presented numerously signed petitions for the abolition of the system. If the reason given for the petitions were real ones they ought to have disappeared upon showing that there was no foundation for them. I think that in many instances the petitions do not represent the real sentiments of those whose names were attached to them. Upon inquiry some of the workmen stated that they liked the system, and had refused to sign the petitions.

Several stated that they did not wish to sign, but had done so under compulsion. It was discovered that the facts alleged in the petitions were not advanced by the actual signers, at least by a considerable number of them. Many signatures were obtained without showing the subject-matter of the petitions which were signed, under which subject-matter these signatures were afterwards copied, to appear in the same handwriting, the signers knowing only that they were signing a petition against the Taylor System. One workman wrote that if there were excluded all who signed the petitions unwillingly, and those who signed without knowing what they were signing, there would be nobody left but the framers. Still, it must be stated that some of the workmen, including men who were earning good premiums, declared voluntarily their opposition to the system.

I think that the petitions have been due to the influence of the labor organizations. I can see some reasons why labor leaders should not like the system; one of these being that since it offers more to Labor than the unions do, its success would threaten the membership of the unions. Another reason for opposition upon the part of Organized Labor is that the system increases the productivity of the individual, which Organized Labor has fought in all the forms in which it has made its appearance. Labor-saving machinery is not now openly opposed by labor unions, but all large employers know the hostility which is felt towards its introduction. Scientific management, being a labor-saving method, comes under the ban, in spite of the fact that increased individual productivity redounds to the ultimate advantage of the working class, as well as to that of everybody else. In the ordinary case the opposition is perhaps to be explained by the fact that, while the ultimate advantage of increased individual productivity is easily demonstrated, the immediate effect upon some individuals is apt to be disastrous, and an immediate remedy for this kind of result has not been produced. At the Watertown Arsenal, however, it can be said that the disastrous effect has not made its appearance, as there has been no dimunition of the working force to offset the substantial increase of wages which has been enjoyed by a large proportion.

I think there are two points of genuine opposition to the system, or at least of criticism of it, by the workmen. One is the inequality of its operation. No man likes to see opportunities for increased earnings offered to his fellows, which have not been afforded to him, even if there is no decrease, or contemplated decrease, in his own earnings. This seems to be in accordance with one of those characteristics which go under the name of "human nature." I think myself that this condition is unfortunate, and that efforts should continue to minimize its effect. However, it is something to which we are accustomed in all kinds of piecework, by which comparatively unskilled workers earn, by giving large output, sums which equal those paid to persons of much more general skill, employed by the day. The second point is that people do not enjoy being paid in accordance with their output. It is much more pleasant to receive good pay irrespective of output. Experience with piece-work in well conducted establishments, such as those under the Government, and the actual experience of those in charge at the Watertown Arsenal, leads to the strong belief that the advantages of payment in accordance with output would not be given up in exchange for return to the ordinary day-wage system. The advantages, however, would be given up in exchange for equal advantages gratuitously bestowed. Interviews with the employees have led me to the opinion that the teaching of the unions at the Watertown Arsenal is that, if the men would join in the expulsion of the premium system, the political power of the unions would be used, and is sufficient to secure the same increase of pay as is had under the premium system, but granted as regular day-wages.

### *Legislation.*

Matters were in this state when, at the last session of Congress, the attempt to enact legislation forbidding premium-payment and time-study took on a new form. Up to that time it had not been possible to secure consideration by either House of Congress of any of the bills embodying the prohibitive legislation which had been introduced; but when the bill making the regular appropriations for the support of the army was under discussion upon the floor of the House, the following legislation was proposed as an amendment to the bill:

> "PROVIDED, That no part of the appropriations made in this bill shall be available for the salary or pay of any officer, manager, superintendent, foreman, or other person having charge of the work of any employee of the United States Government while making or causing to be made, with a stop-watch or other time-measuring device, a time study of any job or any such employee between the starting and completion thereof or of the movements of any such employee while engaged upon such work; nor shall any part of the appropriations made in this bill be available to pay any premium or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operations of any Government plant; and no claim for service performed by any person while violating this proviso shall be allowed."

General legislation on an appropriation bill is not usually admissible, and may be thrown out upon objection by a single Member, upon a point of order. It is probable, however, that this legislation could not have been thus thrown out, for the reason that there is a rule that a provision limiting the conditions of expenditure under which appropriations may be disbursed is not held to be general legislation. A point of order was, in fact, made against this provision, but it was withdrawn when it became apparent that, if pressed, it would have been overruled. There was practically no debate upon the proviso and it was adopted by a large majority. In the Senate there was considerable debate, and some very interesting speeches. The debate is recorded in the Congressional Record of February 23d of this year, and there may be found published, appended to the remarks of Senator Weeks, a good deal of literature which has appeared from time to time in connection with the establishment of scientific management at the arsenals. The same matter was afterwards republished as Senate Document No. 800, 63d Cong. 3d Sess. The Senate rejected the prohibitive legislation, but it was restored in conference between the two Houses, and is now part of the law. It is not, however, as effective as it was designed to be by its proponents. For one thing, it applies only to the fiscal year ending June 30, 1916; and for another, it is not applicable to expenditures from any other appropriations than those made in the bill for the support of the army. The officers who conduct the arsenals are paid from such appropriations; their conduct or direction of time-studies is therefore prohibited, and time-studies have ceased. These had been made at the Watertown Arsenal only; but premium-payments had been made both at the Watertown and the Frankford Arsenal. The work at the Frankford Arsenal being repetitive in its character, lends itself readily to piece-work, and has been transferred to this class, which is not prohibited by the legislation. The work at the Watertown Arsenal is practically all done under appropriations made, not in the Army Bill, but in the Fortification Bill,

and premium-payments for it are therefore not forbidden, and have been continued. The contest for the complete suppression of time-study and the premium system of payment has, however, only been postponed, and will undoubtedly again arise at the next session of Congress. The prospect for its success may be judged by the fact that the majority in the House of Representatives, at the last session, in favor of the legislation passed was six to one. We now have a new Congress, with a large new membership, especially in the House of Representatives, but unless a very considerable effort shall be made by somebody, the indication of the last session is that the work of suppression of these features of scientific management in government establishments will be made complete during the coming winter.

*Report of the Federal Commission.*

The allegation of overwork made by the opponents of scientific management is not easy to disprove, without an investigation of the establishment at which the overwork is charged. As I have already related, there had been only one investigation made by any one outside the Ordnance Department of the operation of scientific management at the Watertown Arsenal, which was by a special committee of the House of Representatives, and this committee did not make any report of facts and conclusions. The Secretary of War therefore requested, about two years ago, that an investigation be made by the Federal Commission on Industrial Relations, created by the Act of Congress approved August 23, 1912. That Commission took up the subject through a committee which it employed for the purpose, of which Professor R. F. Hoxie was chairman, and the two other members were Mr. Robert G. Valentine, representing the employers' interests, and Mr. John P. Frey, representing the interests of labor. This committee made a very extensive investigation of the Watertown Arsenal, and submitted a report to the Commission; but the report has not yet been published. But Mr. Basil M. Manly, the Director of Research and Investigation of the staff of the Commission, made a report which contains a chapter upon scientific management. The Federal Commission on Industrial Relations did not submit a united report, having apparently been unable to agree upon one, but four members of the Commission, a minority, signed the report of Mr. Manly. The Commission consisted of nine members, of whom three were appointed to represent the class of employers, three the class of employees, and three the general public. Other members and groups of members of the Commission submitted reports. The effort, therefore, to obtain from the Commission on Industrial Relations a statement of facts and conclusions in regard to the practice of scientific management at the Watertown Arsenal was not successful, and the only thing we have thus far is the report of Mr. Manly, signed by some members of the Commission, and some other reports signed by other members. None of these makes special mention of the Watertown Arsenal or of the state of affairs there; but we find some interesting statements in regard to scientific management in general.

The report of Mr. Manly contains a statement of a number of points in which scientific management is held to have failed of attainment of the results which its advocates have claimed for it, as actually found in practice by the investigating committee. A good many of these failures, if admitted, would constitute proof simply that the fallible management of various ones of the establishments investigated has been unable to reach a very high degree of perfection in putting in practice the principles of scientific management, as preached by its advocates, and would not constitute an arraignment of those principles themselves. The charge should simply lead to efforts at improvement of the management of the establishments which aim at scientific management.

Some of the criticisms mentioned by Mr. Manly, are, however, I think, not well taken. For instance he charges failure to substantiate the claim of scientific management of having established a scientific and equitable method of determining wage rates. Particular reference is made to the base rates upon which premiums or bonuses are built. I do not remember any claim of the Taylor system with reference to the establishment of base rates. The rule in the government service is to take the rate of the vicinity; and at the Watertown Arsenal we build the premiums upon this rate. The division of profits in an industrial enterprise, in the form of dividends to capital and wages to labor, has never, so far as I know, been made in accordance with any principle. It results simply from the pull and haul of these two agencies involved in production, whose interests, in this respect, can not be identical, however completely identical they may be in so far as the accumulation of profits for division is concerned.

Another charge is failure to protect workers from overexertion and exhaustion. At the Watertown Arsenal we have made no claim of such protection. We do claim that the times set for the completion of tasks are reasonable, and do not require over-work. If they are found unreasonable they are subject to correction, upon complaint. Whether or not they are really reasonable can quickly be determined by investigation in a particular case. A number of such investigations have been made and it has been found that over-work, in these instances, was impossible. There may be difference of opinion as to the advisability of stimulating men by rewards so high that they are tempted to over-exert themselves in order to secure them; and some argument might be made in favor of refusal to pay additional premium for bettering the time which is set as reasonable by time-study. But as there has been no complaint of over-work on the part of any workman at the Watertown Arsenal, no necessity for such refusal has arisen.

Labor union officials have urged upon the War Department that, even if there should be no over-speeding in the government service, time-study affords a weapon which in the hands of unscrupulous employers might be used for this purpose, and which therefore ought to be forbidden, just as is the carrying of concealed weapons. This plea is based upon apprehension, and not upon any facts which can be shown to exist at the Watertown Arsenal. That any portion of a beneficial practice should be discontinued because, under possible circumstances, it might be used as an instrument of oppression is not sound doctrine.

A charge which does relate to the principles of scientific management is, however, made. It is stated that under such management there is a lack of democracy, and this is coupled with the statement that, as a result of the investigation, there can be little doubt that scientific management tends, in practice, to weaken the power of the individual worker as against the employer; that it tends, on the whole, to prevent the formation of groups of workers within shops with recognized common interests, and to weaken the solidarity of those which exist; that the gospel of scientific management to the worker is to the individual, telling him how, by special efficiency, he can cut loose from the mass, and rise in wages and position. Admitting these statements to be true, they seem to me simply to constitute another way of saying that scientific management essays to

out-bid the unions for the favor of the workmen, and thus to win the workmen away from the unions. The only way in which the management can weaken the allegiance of the workmen to their labor organizations is by offering them something better than these organizations offer, and this is what is done. We all know the turmoil and disorganization which can result from a union demand, say for a ten per cent increase in wages; while scientific management thinks nothing of a thirty per cent increase, and aims to bestow it with frequency. To assert that the object is to break up the unions, and ultimately to bring compensation back to the point at which it started, is gratuitous and entirely speculative.

It is asserted that collective bargaining has, under scientific management, no place in the determination of matters vital to the workers; but this, at present, is true only because the individual bargaining of scientific management so far transcends anything which the labor organizations have consented to consider collectively. If the principles of scientific management could be accepted by Organized Labor, there would still be found many things properly subject to collective bargaining. For instance, the practice at the Watertown Arsenal of establishing a 33 1-3 per cent premium for meeting the task time might, under the circumstances which I have indicated, be held by the workers collectively to be properly alterable so as to afford a 50 per cent premium. Of course such a contention would not succeed as long as industry in general should offer no premium at all, because failure to agree to the 50 per cent premium would then involve the management in no difficulty in supplying the places of the workmen who might carry their collective resistance to the point of strike; but if the common practice should be made such as to accord with the 33 1-3 per cent premium, the unions would have the same opportunity to gain an advance by the collective method, that they now have of obtaining any improvement of conditions, by that method.

Mr. Manly's report makes the general statement that beneath all other causes of short-comings of scientific management, in its relation to labor, there seems to be the practical fact of an opposition of interests between the profit-taking and the labor groups, which makes it extremely doubtful that its short-comings, from the standpoint of labor are capable of elimination. This statement may very well lead to the inquiry whether it means that the welfare of labor must be considered irrespective of profit. It seems to me that there must always be an opposition of interests between the classes among whom the profits have to be divided, but there is no opposition of interests in so far as the attempt to insure that there shall be profits is concerned. To charge this particular opposition of interests to scientific management is to ascribe to this system alone a feature which is common to all employment of labor for profit. For my part I do not see why the system of time-study and premium-payment, as practiced at the Watertown Arsenal, could not be applied to a perfectly mutualized industrial establishment, in which the compensation of all the individuals engaged should be determined in accordance with their output, wherever practicable, as it is at the arsenal, and the profits could then be divided among those involved in proportion to their earnings, or by any other scheme which might be agreed upon. In fact, I do not see that such a perfectly democratic organization could adopt a more equitable scheme for its conduct than one which would accord strongly with the principles of scientific management, as preached by the scientific management experts. It must be remembered that criticism of scientific management is not made in comparison with some other ideal system which nobody has yet realized, but in comparison with the system, or lack of system, which it is designed to replace; and it must be remembered also that scientific management does not claim to have solved all the problems of industry, among which is this problem of a proper division of profits.

Mr. Manly's report seems to join with the unions of skilled craftsmen in condemning anything which would tend to reduce the demand for skilled men in a given trade by contriving methods of substitution of lower-grade men, of less training, for the skilled craftsmen. This view seems to rest upon the belief that it is to the advantage of humanity to have as large a part as possible of the world's work such that it can be performed only by people of special skill and training; which seems to me to be equivalent to saying that it is best that nothing shall be easily done. I can not understand why it should appear to be advantageous to preserve any given trade, or any given profession, if the results of the trade or profession could be more easily and cheaply made available for humanity by some other method than its preservation. I do not see, for instance, why it would not be advantageous if we could induce shoes to grow on trees, so that we would no longer need the services of skilled shoemakers in order that the world might be provided with shoes. A good many steps tending towards better provision have already been taken in the shoe trade, and there has been much elimination of dependence upon all-round skilled shoemakers, with the result that more of the world can wear good shoes than ever before. Other crafts have disappeared as the introduction of new methods has freed the people from dependence upon them, and in all cases the result must be pronounced good. Why, then, should a method which increases production of something which is needed, and raises the standard of living of numbers of people concerned in the production who have not been fortunate enough to secure the training of an apprenticeship, be condemned because it is alleged to threaten, for instance, the machinist's trade, or any other trade, by showing how we can get along without it? As a matter of fact, we have not found our need for skilled machinists to have diminished since the introduction of scientific management at the arsenals, and I do not think that it can be maintained that the great progress of specialization in industry, or the introduction of labor-saving or partially automatic machinery, has lessened the demand of the industrial world in general for special skill; while these things have undoubtedly improved the condition of unskilled labor and have afforded a means of increased earnings. The time study and premium features of scientific management have, in fact, opened up to the machinist his first chance of increasing his wages by means of measured output, requiring his high skill, in the same manner that the machine operator or narrowly skilled handy man increases his lower wages by output calling for less general skill. Nobody before the scientific managers has found a way to enable the ordinary $3.50 a day all-around machinist to earn, practically right along, $4.50 a day at general machinist's work.

### *Dissenting Report.*

Three members of the Federal Commission on Industrial Relations signed a report dissenting from the alleged finding of fact and, in a general way, from the comment made thereon, in the report submitted by Mr. Manly without the indorsement of the Commission; which they state to be so manifestly partisan and unfair that they can not give them their indorsement. With regard to the opposition of Organized Labor to scientific management, they place themselves in line with the opinion expressed by Louis D. Brandeis, in